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BOTANICAL GAZETTE.

VOL. 3

APRIL, 1878.

No. 4

EUCALYPTUS GLOBULUS.—Having been led to raise the *E. globulus* from seed for experimental purposes, the last summer, the plant afforded opportunities for some quite interesting observations. This tree is not only remarkable for its rapid growth when young, but equally so for some curious eccentricities of character. To those familiar with the growing "Blue Gum," probably these observations are not new; but to the readers generally of the *GAZETTE*, they will prove interesting, as they certainly were to the writer. Sown in March, in a flower-pot in the sitting room, the seeds pushed up each a pair of bright red cotyledons. The young tree, even when of respectable height, say 15 feet, presents a crowd of specific differences, as species in plants are to-day determined. There would be no difficulty with a young "Blue Gum" on his table, for the teaching botanist to illustrate a variety of leaf characteristics, considered constant and as specific distinctions in other genera. And when the flowering age comes, the adult tree demurely abandons these early inconstancies. In thrifty growing specimens, the young *E. globulus* has a four-sided stem like the labiates, with sharp thin extensions at the corners. The leaves like those of our own deciduous trees, present the upper side to the sunlight, with one side, as a matter of course in the shade. They are sessile, with the base notched or heart-shaped, and they are opposite, thus the ears or lobes of the notch of one leaf lap or lie upon the corresponding parts of its fellow opposite, looking at a little distance as if they might be perfoliate, much as appear the upper leaves of the *Lonicera* or Woodbine. Now in the adult tree the leaves are long petiolate, and very long lanceolate. They are also alternate, and to crown the eccentricity of habit, they are arranged edgewise to the sun-light; that is, the upper and the under plane of the leaf are equally exposed to the sun. In dried specimens before me from Santa Barbara, Cal., I find that these great lanceolate leaves are decidedly falcate, and the queer thing is that the concave edges of these scythe-like leaves, are invariably set uppermost. It is observable, too, that while the leaves of the young individuals are glabrous and dark green above, and the undersides are pale, and a little glaucescent, and the mid rib is of course most prominent below, and the resin glands most conspicuous there these conditions disappear in the leaves of the older tree. Now the glabrous-green has gone and both sides of the leaf are of a whitish hue, and the glands are equally discernable on either side—and strange indeed! the mid-rib and the cardinal veins are nearly equally prominent on either side of the leaf.

The growth of this Blue Gum is truly astonishing. In May of this year Dr. R. E. Kunze, of New York, set a plant two feet high, taken from a conservatory, in his back yard. On the 10th of October it was about 12 feet high! Allowing the proper time for it to rally from the shock of transplanting and change of place, it must have averaged an inch of growth per day.—SAMUEL LOCKWOOD, *Freehold, N. J.*

BRYOLOGICAL NOTES. BY C. F. AUSTIN.—*TRICHOSTOMUM* ? *SUBDENTICULATUM*, n. sp.—Humile, fusco-viride; foliis siccitate involuto-crispatis humiditate patentibus e basi angustata canaliculata caulem ad $\frac{3}{4}$ -amplectente late elliptico-oblongis non nullis convoluto-concavis aliis planiusculis, margine nec recurva nec crenulata versus basin late undulata versus apicem obtuse mucronatam minutissime denticulata, dorso minutissime papilloso, costa valida flavesciente vel subrufa lævi percurrente,

cellulis minutissimis subnitidis (vix granulosis) rotundo-quadratis, basilaribus majoribus magis minusve pellucidis (sæpe (?) subfuscis): cætera ignota.

With *Tortula agraria* and *T. Donnellii*, on shell banks, in the Everglades of Florida, March, 1877, *J. Donnell Smith*.

The most striking characteristics of this moss are its short stems, broadly elliptico- or lanceolate-oblong obtusely mucronate leaves from a much narrowed pellucid almost vaginal base, with the margins somewhat undulate (at least towards the base), some nearly plane, others strongly convolute-concave above, immarginate, neither recurved nor papillose-crenulate on the margin, remotely and minutely denticulate towards the apex, very minutely and closely papillose on the back, costa stout, smooth and percurrent, cells at the base considerably enlarged, the ordinary ones most minute and scarcely granulose.—Possibly a species of *Tortula*; but apparently allied to *Trichostomum* (*Didymodon*) *riparium* (*Pottia riparia*, AUST. Musc. Appalach.); but that has the leaf never so strongly concave, with a shorter less clasping base, a more distinctly dentate or often coarsely serrate apex, the back less closely papillose, cells twice as large,—the basilar ones less pellucid; color more brown, &c.

The following additional notes were made in comparing with other species:

Tortula agraria, HEDW., is a little smaller, with the leaves more spatulate, more acute, composed of larger cells, &c. Cells of the leaf quadrate, not granulose nor opaque, distinctly defined, the basilar ones considerably enlarged and truncate; perichætal leaves (2) scarcely convolute, oblong or lanceolate-ovate, acutish, heavily costate; outer capsule-wall composed of rather large and broad cells; peristomal teeth flattish (*taeniate*), with a pellucid medial line, papillose, much twisted, dark red: stems very short. A small species.

Tortula Rauei, AUST. (Torr. Club Bull. VI., p. 43.) is nearest to *T. agraria*; but the leaf is more ovate, much more concave, more crisped when dry, more acute; cells opaque and granulose, less quadrate,—the basilar ones more enlarged, less truncate at both ends; perichætal leaves thinner, broader, strongly convolute, often obtuse, very lightly (or even obsoletely) costate; outer wall of the capsule composed of smaller and narrower cells; peristomal teeth terrete, without a medial line.

T. cæspitosa, HEDW. has the leaf granulose, more undulate, cells larger and each bearing 2 or more papillæ on its back, the papillæ projecting beyond the otherwise entire margin, thereby giving it a crenulated appearance.

Calymperes Richardi, C. M. has somewhat narrower leaves, which are broadly margined towards the base, the margins above involute and entire; basilar cells much larger and more hyaline and extending much farther up the leaf; ordinary leaf-cells a trifle larger, more acutely angular, closer, and when viewed under the microscope with transmitted light they exhibit a single papilla on the back of each as a minute shining speck.

Tortula recurvifolia, SCHIMP.—I found a few stems of this species, mixed with *T. intermedia* (BRID.) in crevices of rocks near the Weehawken Oil Docks, N. J., and also at Suffern, N. Y., in 1866. Messrs. Wollé and Rau and myself found it in Watkin's Glen, and I also found it at Niagara Falls, in 1874. Some one, Mr. Warne, I think, has sent it to me from Colorado, and both Mr. Macoun and Mrs. Roy have sent it from Canada. The Canada specimens are very small and slender, with the leaves short and mostly not recurved. All the specimens are sterile.

Tortula Closteri, AUST., (in BOT. GAZETTE, I., p. 29.) is characterized by its sublinear, or oblong-lanceolate subcarinate remarkably granulose leaves, very slightly recurved on one of the margins below the middle, with a minute hyaline apiculus; apex of the leaf often strongly recurved.—Closter and Camden, New Jersey. Also, Gainesville, Florida, *Ravenel*. Very rare; sterile.

TORTULA DONNELLII, *n. sp.*—Dioica, parvula, gregario-cæspitosa; caule 1-2 lineas alto nonnullo sub gracili, foliis siccitate valde involuto-crispatis in humore subpatentibus subspatulatis oblongo-junioribus -ovatis senioribus-lanceolatis acutiusculis et acutis submucronatis profunde canaliculato-concavis (senioribus subcarinatis), dorso scabrisculo, facie interiore ob cellulas prominulas subpapillosa, margine erecto-involuto (sæpe in medio adspectu incrassato) haud limbato apice minute obsolete serrulata, costa valida percurrente sublevi, cellulis perminutis rotundo-quadratis haud granulosis, illis in foliis junioribus homogenis, basilaribus in senioribus longioribus vix latioribus paulo pellucidioribus: fructu et pl. masc. ignota.

Banks of the St. Lucie River (with *T. agraria*), *John Donnell Smith*.

About the size of *T. agraria* and *T. Rauai*, and not readily distinguished from them; but they both have shorter stems, with the male and female plants growing together, broader more spatulate, more acute, less concave leaves, composed of larger cells, the basilar ones much broader and more pellucid. Furthermore, the former is distinguished by its leaves being but slightly crisped when dry; and the latter by its granulose leaves.

GRIMMIA SUBINCURVA, *n. sp.*—Caule erecto compacte cæspitoso simpliciter vel apicem versus furcato, foliis subconformibus indistincte spiraliter tristichio siccitate tortilibus madefacte erecto-apertis ovatis et ovato-lanceolatis canaliculato-carinatis lævibus, apice angusto mutico subincurvo, margine plano vel hic illic anguste recurvo, costa mediocri percurrente, cellulis parvis haud granulosis illis versus apicem subquadratis illis a medio versus basin paulo latioribus sesquiquadruplo longioribus paulo pellucidioribus haud sinuosis: cætera ignota.

On rocks, Colorado, *Brandegee (Rau)*.

Size (small) and mode of growth much as in *G. conferta*; but that has the leaf usually hyaline-apiculate, or often shortly piliferous, margin more recurved, cells smaller, those below much smaller and less elongated. Color and general appearance of *Zygodon Mongeotii* with which it was found growing, but from which it is readily separated by its much shorter obtusish not granulose leaves, composed of larger cells, those below more elongated, &c.—The species is chiefly characterized by the mutic, subincurved apex of the leaf. Cells in the upper part of the leaf often broader than long, slightly obscure.

HYPNUM (Rhynchostegium) ROYÆ, *n. sp.*—Dioicum; caule rigido tenui gracili stricto parce ramoso rigido subcompresso, foliis dissitis erectiusculis et semipatentibus ovatis et ovato-lanceolatis acute acuminatis leviter concavis toto margine plana minute serratis ultra medium costatis, cellulis mediocribus ovali- et oblongo-rhombeis lævibus; flore fœm. magna, foliis perichætalibus e basi oblongo-ovata longe subulato-acuminatis ecostatis (exterioribusve leviter costatis), acumine squarroso subserrato, paraphysibus compluribus longis: cætera ignota.

California, *Mrs. Jessie Roy*.

A small species; not larger than the usual forms of *H. serpens*, distinguished by its straight stems, distant erectish leaves, &c.

HYPNUM (Rhynchostegium ?) BRANDEGEEI, *n. sp.*—Dense cæspitosum, aureo-viride, subintens; caule subunciali erecto subsimplici tumidulo compressiusculo, foliis imbricatis late ovatis concavis late 2-3 plicatis abrupte breviuscule subulato vel piliformi-acuminatis, margine plana integerrima obsolete serrata, costa simpliciter vel bicurva vix ultra medium producta, cellulis laxiusculis anguste oblongo-fusiformibus strictiusculis basilaribus paulo latioribus brevibus et brevissimis: cætera ignota.

Colorado, *Mr. Brandegee, (Rau)*.

Near the European *Hypnum murale*, HEDW.; but that has the leaves rather more concave, always more acuminate (never piliferous), and furnished with a stouter and

longer costa, and with narrower and more vermicular cells. *H. piliferum*, SCHREB., has much longer often subpinnate stems and serrate leaves with a longer pilum and different areolation.

Hypnum Coloradense, AUST., (BOT. GAZETTE, II., p. 111,) is also a somewhat similar moss; but is much more robust, with rather more compressed stems, and oblong-ovate leaves, furnished with a much longer pilum, and composed of much longer and narrower cells.

I have lately received a moss from Mrs. Roy, under the name of "*Hypnum cariosum*," collected in Scotland by Rev. J. Ferguson, which is about the size of *H. Coloradense*, and has the same piliferous and concave leaf; but differs from it, as well as from the other species mentioned above, in having the leaf distinctly auricled, the auricles minute and composed of somewhat inflated cells; the rest of the lowermost alar cells are very minute, subsolid and opaque.

There is a compact form of *Hypnum acuminatum*, BRAUV., which occurs abundantly on the roots of trees in woods about Closter, which somewhat resembles *H. BRANDEGER*, but it is of a dark green color, the leaves are more plicate, with the apex less abruptly and never piliferously acuminate, the margins more or less recurved and serrate, costa always single, &c.

THE CONIFERÆ OF THE CRESTONES.—The Crestones are pinnacles of rock on the Sangre de Cristo spur of the Rocky Mountains, rising to an elevation of 14,200 feet above sea level. The altitude of timber line is about 12,000 feet, but as most of the *Coniferæ* upon the northern slope have been killed, it does not appear so plainly marked as in many parts of the Rocky Mountains. At 10,000 feet altitude, all the *Coniferæ* of Colorado excepting *Juniperus Virginiana* and *occidentalis* and *Pinus edulis* can be seen growing together. *Abies Engelmanni* is the most abundant tree above 10,500 feet altitude, and *A. concolor* the predominant conifer below that altitude.

Pinus contorta, Dougl., is abundant upon some dry ridges and is generally so small that hardly any of it can be called trees. Its leaves are persistent seven years and its cones very many years. Old dead trees are full of the persistent cones. Nothing but wings of seeds could be found in these old unopened cones.

Pinus ponderosa, Dougl., is found up to 10,000 feet altitude. It bears *Arceuthobium robustum* in great quantities. This pine often throws its parasite-bearing limbs and branches amongst those of other pines and spruces, but the *Arceuthobium* grows only upon those of *P. ponderosa*. Its leaves are persistent six and seven years. The cones begin to open about the first of October, the scales opening first at the base.

Pinus flexilis, James, is not common, but single trees are found scattered about up to an elevation of 11,000 feet. The leaves are persistent three and four years. The seed falls between Sept. 8th and 20th, those growing at low altitudes ripening first. Some seeds near the base of the cone are held in by the scales not opening wide enough to let them fall.

Pinus aristata, Engelm., is common at timber line and like many alpine plants comes down to a lower altitude. Here it is found at 10,000 feet, and west of Pike's Peak I have seen it below 8,000 feet altitude. Trees at 11,000 were beginning to drop their seed Oct. 6th. Its leaves are persistent 12 and 13 years.

Abies Engelmanni Parry. The lower limit of this species is 10,500 feet, but many trees come down to near 9,000 feet, generally, however, growing in shaded situations. The dwarfed, prostrate, cone-bearing trees are plenty at timber line, but the very large magnificent forms of the western slope are not found in the Crestones. It is a very variable species. The branchlets may be either pubescent or smooth and shining, so that it cannot be separated from *A. Menziesii* by this character alone. At higher altitudes the branchlets are always pubescent, but at its lower elevations they are often